DPS Pasadena Meeting 2000, 23-27 October 2000
Session 11. Outer Planets III - Chemistry, Thermal, and Structure
Oral, Chairs: J. Clarke, T. Kostiuk, Monday, 2000/10/23, 4:40-6:00pm, Little Theater (C107)

[Previous] | [Session 11] | [Next]

[11.06] Photometric Observations of Neptune by the ISO Long Wavelength Spectrometer: the He/H_2 ratio and the Effective Temperature

G. Orton (Jet Propulsion Laboratory), M. Burgdorf (ISO Data Centre, Villafranca), G. Davis (U. Saskatchewan), S. Sidher, M. Griffin (Queen Mary and Westfield College, London), B. Swinyard (Futherford Appleton Laboratory, UK), H. Feuchtgruber (Max PLanck Institute fur Extraterrestriche Physic)

Neptune was observed by the Infared Space Observatory Long Wavelength Spectrometer (LWS), with particularly long integration times at several discrete wavelengths between 46 and 100 microns. The photometric accuracy of the data is considered by to be on the order of 3 - 5 %, and it is based on a calibration system involving atmsopheric models of Uranus and thermophysical models of Mars. The 46-micron point is used to provide a fine adjustment to the calibration of ISO Short Wavelength Spectrometer (SWS) data between 29 and 45 microns. The SWS data show a good agreement with Voyager IRIS observations. With the SWS data constraining the temperature on the long-wavelength side of the S(0) collision-induced dipole of H_2, the LWS data are sensitive to the relative abudances of He and H_2. A preliminary best fit value to the He/H_2 ratio is 21±6%, implying a mixing ratio of He of 17±6% if CH_4 is assumed to be 2% in the troposphere. This value is consistent with that derived by combining the observations of the Voyager IRIS and radio occultation experiments, a technique whose accuracy has been called into question recently. The physical model also does not require the existence of an optically thick CH_4 cloud to match the data. The LWS data cover a portion of the spectrum that contains 50%, and the LWS and SWS together cover 75%, of the outgoing thermal emission. The data are consistent with an effective temperature for Neptune that is 59.6 Kelvins, with the uncertainty assumed to be 5% (±0.7 Kelvins). This is also close to the value derived by the Voyager IRIS experiment.

The author(s) of this abstract have provided an email address for comments about the abstract: MS 169-237, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109

[Previous] | [Session 11] | [Next]